By Facsimile

Amendments to the Specification

Kindly, substitute the following paragraph for that starting on line 28 of page 7 and continuing to line 23 of page 9 of the specification:

The numbers shown in the figure identify each of the pixel groups and appear as subscript labels in the following discussion. In an image having any particular brightness values at its pixels, the mean brightness values of the six groups surrounding the central group may be represented as a vector $B = (B_1, B_2, B_3, B_4, B_5, B_6)^T$, where the superscript T denotes a transpose operation that converts a row matrix to a column matrix. A Local Radial Angular (LORA) transform $L \rightarrow c$ is defined as $c = RB$, where $c = (c_1, c_2, c_3, c_4, c_5, c_6)^T$ is a vector of transformation coefficients. R is a six by six square matrix whose elements are formed according to:

$$R_{km} = (1/\sqrt{6}) \parallel exp[i\,(k-1)\,(m-1)\,\pi/3] \parallel, \quad (k, m = 1,2 \ldots 6)$$

where i is the imaginary unity (i.e., the square root of -1), π is the ratio of the circumference to the diameter of a circle, and k and m are the row and column indices of the matrix elements. The explicit form of c_3 is given by:

$$c_3 = (0.5/\sqrt{6})\,(2B_1 - B_2 - B_3 + 2B_4 - B_5 - B_6) \; + \; i\,(0.5/\sqrt{2})\,(B_2 - B_3 + B_5 - B_6)$$

so that the real and imaginary components of c_3 are given, respectively, by:

$$\mathrm{Real}(c_3) = (0.5/\sqrt{6})\,(2B_1 - B_2 - B_3 + 2B_4 - B_5 - B_6)$$
$$\mathrm{Imaginary}(c_3) = (0.5/\sqrt{2})\,(B_2 - B_3 + B_5 - B_6)$$

The magnitude of the modulus $|c_3|$ of the transformation coefficient c_3 has been found to be an indicator of the presence of a line-like feature in the image lying under the hexon superimposed over the image. There are two values of $|c_3|$ corresponding to the orientations 1 and 2 shown in Figure 1. These separate values $|c_{13}|$ and $|c_{23}|$ may be combined into a

single value $|c_3|$, for instance by taking the larger of the two, taking the square root of the sum of the squares, weighted averages, and the like. The magnitude of $|c_3|$ can be considered the strength of a line response in the image. It is also possible to define a different hexon response, δ_3, which is a measure of the line purity. This hexon response quantity is defined as:

$$\delta_3 = 2\,|c_3|^2 / \sum_{k=2}^{k=6} |c_k|^2$$

Other definitions involving weighted functions of the coefficients c_k are also possible. Since coefficients other than c_3 respond to image features that are not lines, δ_3 is a measure of the degree to which the c_3 response represents a line. There are separate values, δ_{13} and δ_{23}, of this measure for hexon orientation 1 and hexon orientation 2, respectively (see Figure 1). These may be combined into a single value of δ_3 by any convenient means, for instance by using the larger value. The c_3 coefficient responds to lines that are both dark and light with respect to the background upon which they lie and by default both types of lines are detected. However, it is also possible to selectively detect only light lines or only dark lines. This may be achieved in various ways. For example, the mean brightness or channel value at the quasi-pixels lying closest to the line may be compared to the value of $c_1/\sqrt{6}$. Alternatively, the lightness or darkness of a line may be estimated from the real and imaginary parts of the c_3 coefficient by comparison to thresholds T_1 and T_2 according to the following logic:

if $|\text{Imaginary}(c_3) / \text{Real}(c_3)| \le T_1$ and $\text{Real}(c_3) > T_2$ then Light
if $|\text{Imaginary}(c_3) / \text{Real}(c_3)| > T_1$ and $\text{Real}(c_3) < T_2$ then Light
if $|\text{Imaginary}(c_3) / \text{Real}(c_3)| \le T_1$ and $\text{Real}(c_3) < T_2$ then Dark
if $|\text{Imaginary}(c_3) / \text{Real}(c_3)| > T_1$ and $\text{Real}(c_3) > T_2$ then Dark

While the value of T_1 depends on the detailed geometry of the hexon, a preferred value of the threshold T_1 is from greater than about 0 to less than about 0.57. An especially preferred value is about 0.07 to about 0.41, with a most especially preferred value of about 0.3. The preferred value of T_2 is about 0. In this way either light or dark lines may be separately detected.